Items #68: Vegetation Composition, Structure, and Landscape Pattern

Evaluation Question: How do existing conditions compare with the estimated range of natural variability?

Resources to be measured: Composition, structure, pattern by subbasin

Data Sources:

- Forest Plan Amendment 21,
- Forest activity database (FACTS) and fire history data
- Forest Inventory and analysis (FIA) Summary Database for current conditions

This monitoring item was established in 1999 with completion of Amendment 21 to the Forest Plan and was designed to look at changes in overall vegetation over time. Item 70 is related, and addresses within-stand structure of snags and coarse woody debris.

During the preparation of amendment 21 (A-21), extensive analysis of both current and historical vegetation conditions was conducted using a variety of tools. Data was summarized in several formats, most specifically by subbasin and potential vegetation group. Columbia River Basin modeling over a 400 year period was used to produce estimates of the historical range of variability. This data provides a baseline for looking at future vegetation changes. The figures and text on page 39 to 47 of the amendment provide great detail.

In general, late-seral forest was found to be below historical minimums in all sub-basins in all community types. In most sub-basins and types, mid-seral forest exceeded the historical maximums. Early seral varied by sub-basin, being within historic ranges in some drainages, and below historic minimums in others.

All sub-basins reflect high variability in vegetative composition, reflective of the general influence of long-fire intervals in our forests, and past large-scale stand-replacing fires. Harvest activity has been a factor in the reduction of late-seral forest, and the change in species composition in some areas. Overall, there is a dramatic increase in mid-seral forests and shade tolerant tree species. Forest structure has changed, resulting in a more homogeneous landscape pattern at greater risk of fire, insect, disease, and stress.

In addition, forest patch size in late and early seral had been significantly reduced from historical, based on the small scale patchwork of management activities. Mid-seral patch size has increased.

The FIA summary database provides the best available tool for description of current vegetation conditions by watershed. The more than 380 permanent plots are on a grid across the forest, and are re-measured over the course of a decade. This data provides a statistical estimate of conditions, with associated confidence intervals. The following tables display size, age, species and canopy cover attributes by major watershed. Current data reflects plots collected through 1995, with removal of plots subsequently affected by fire or harvest. A planned 2011 update of the Summary Database will bring in new data more reflective of current conditions. Over time, this data can help track departure from historical conditions and trends as disturbance and

management occur on the landscape. Graphics depict estimates without associated confidence intervals.

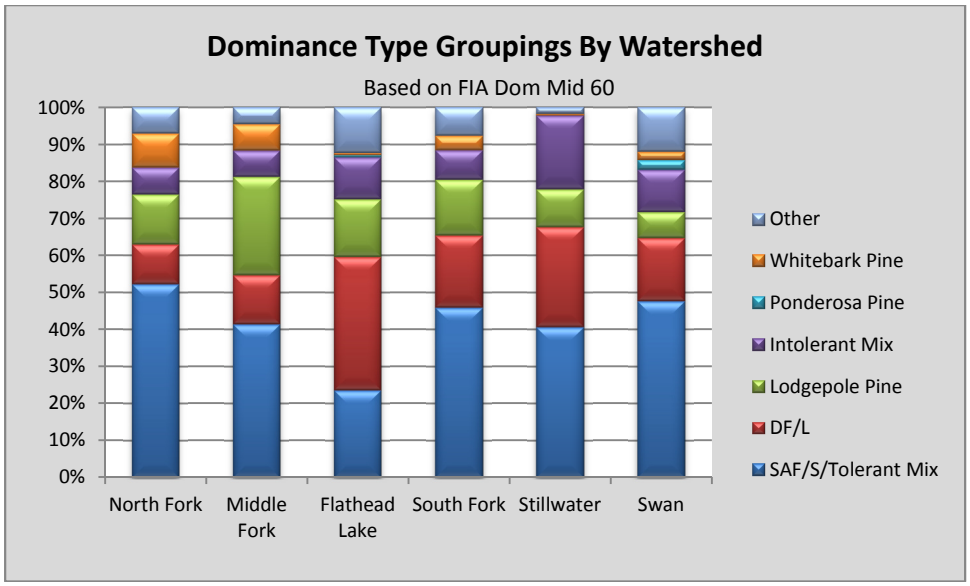

Figure 1: Dominance Type by Watershed

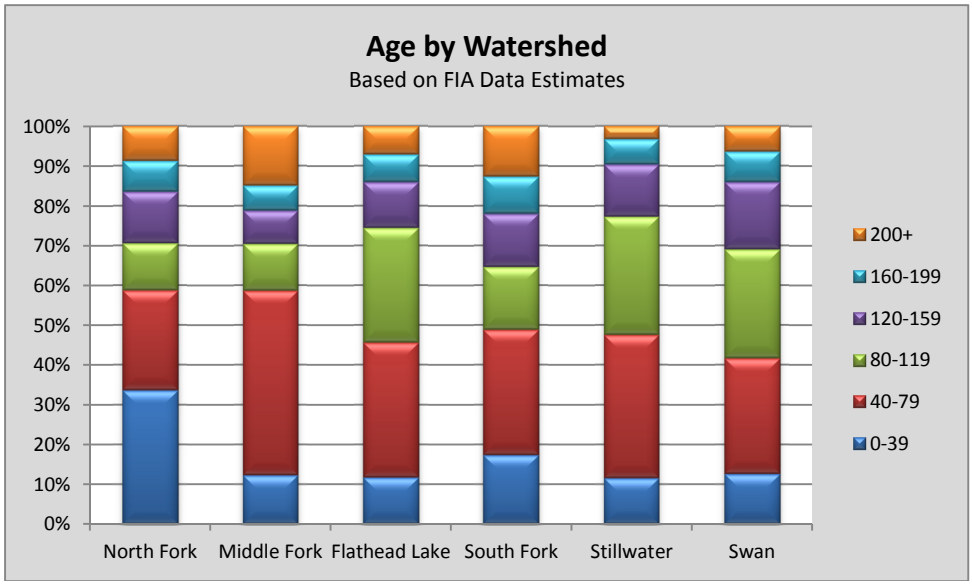

Figure 2: Forest Age by Watershed

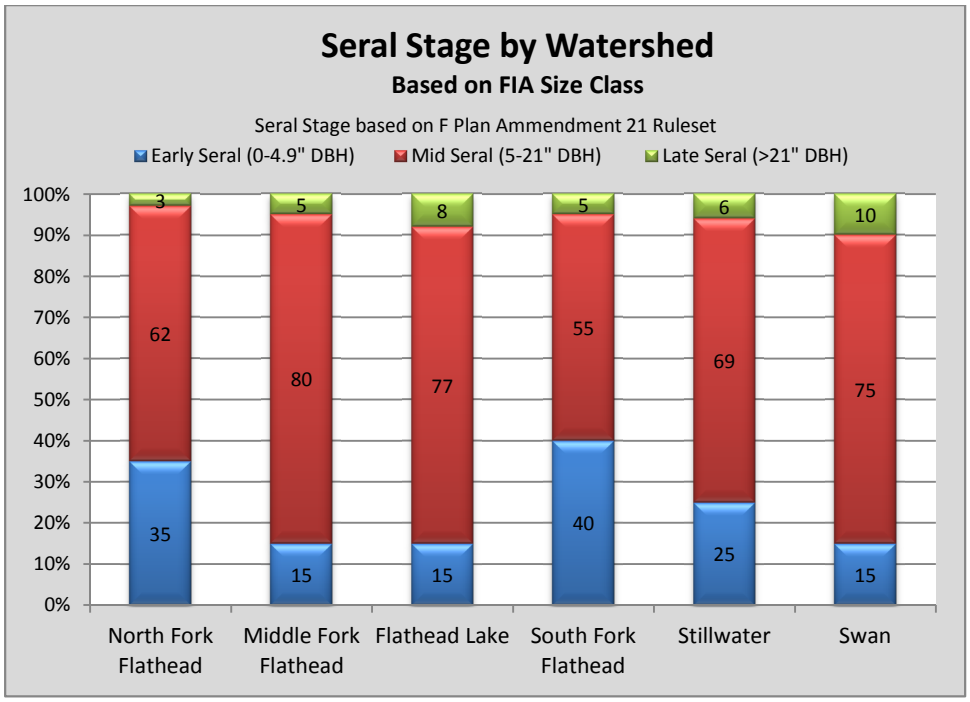

Figure 3: Seral Stage by Watershed

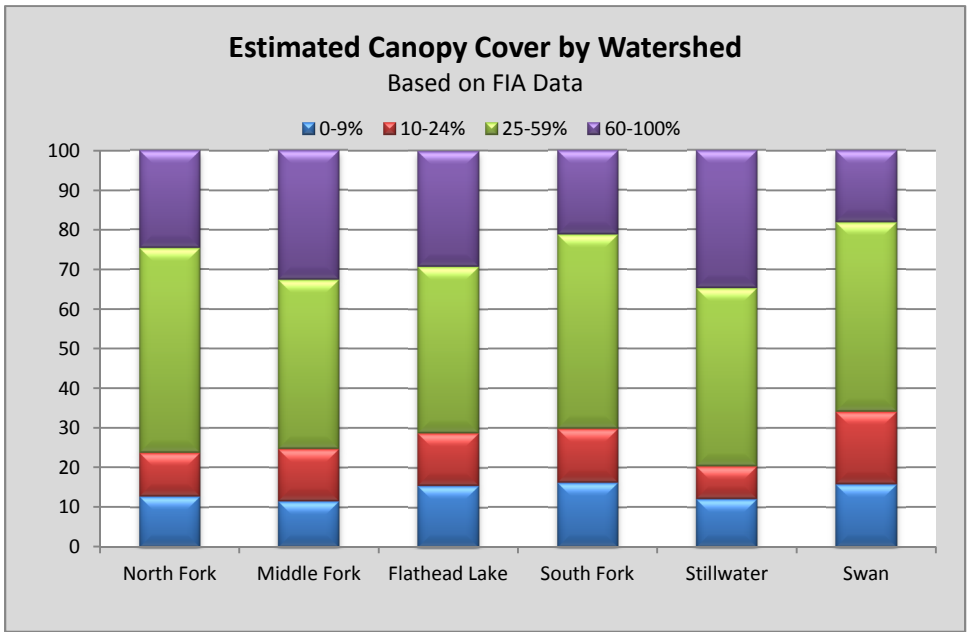

Figure 4: Canopy Cover by Watershed

These graphics depict the forest conditions in a different format than amendment 21 did, but tell the same overall story, with some level of variation between major drainages:

- Preponderance of shade intolerant species across the forest due to the combination of site conditions and disturbance or lack of disturbance over the last century
- A general "bulge" in the middle age and size classes, with the exception of the North Fork of the Flathead, which has a more even age class disturbance
- Late seral forests currently represent a small percentage of all watersheds
- Canopy cover in the 25-59% range dominates all watersheds, with less than a third of all watersheds having canopy cover greater than 60%

Evaluation

While data is not available to the specificity of the original amendment 21 analysis, some inferences can be drawn from the brief summary of recent changes.

Fire has caused sizeable changes on the landscape in the last decade, dwarfing the impacts due to forest management. The magnitude of change on the landscape over the last decade due to harvest represents only 9% of the total change that has occurred.

Due to the high variability of historical conditions, we cannot conclude that the extent of fire in the last decade is outside the historical range. Large stand replacing wildfires have always been part of the natural processes which have shaped historical conditions on the forest. Much of the mature forest visible today is from a series of large fires which occurred between 1910 and 1929 when more than 800,000 acres burned in the Flathead Valley (data from A21, includes all ownerships).

Fires, as well as regeneration harvests, have a tendency to "reset" areas towards more shade intolerant species of western larch, lodgepole pine, and Douglas-fir, moving towards historical conditions. However, modern day large fires in western Montana are generally larger, and often more intense than historical, due to their greater fuel loadings and recent drought conditions (Keane and others, 2002). This may result in subtle or not so subtle shifts in species composition and stand structure compared to historical conditions. These sorts of changes can only be witnessed over large areas and long timeframes

Fire also has a tendency to move areas back towards larger patch sizes which have historically been the norm. Harvest has a tendency to occur on smaller areas, causing some degree of fragmentation of the landscape, more similar to the results of mixed-severity fires.

Particularly within the North Fork of the Flathead National Forest, change due to natural causes has altered both the composition and structure of the landscape to a considerable degree in the last decade. These changes benefit some species of plants and animals, while being a detriment to others. Other drainages have been impacted to lesser degrees by fire.

In the future, FIA data can be used to more systematically track these changes in forest composition and structure over longer timeframes.

Recommended Actions

- Continue to monitor broad-scale changes in vegetation due to natural processes as well as management. During Forest Plan Revision we may choose to use FIA data to create a new forest-wide baseline, which can then be re-summarized on a 10-year basis. A new national system for tracking burn severity over time (www.mtbs.gov) may provide additional useful data. Broad scale remote sensing mapping efforts such as VMAP could also be used to monitor changes in forest pattern.
- Continue to use both harvest and fire as tools to move towards desired vegetation conditions, more consistent with the historical range of variability